

AMENDMENT CLAIMS UNDER ARTICLE 19(1) (RULE 46)

1. A high-resistance silicon wafer having resistivity of 100  $\Omega\text{cm}$  or more, wherein an oxygen precipitate (BMD) having a size of 0.2  $\mu\text{m}$  or more is formed so as to have density of  $1 \times 10^4/\text{cm}^2$  in the wafer, an oxygen concentration in the wafer is  $12 \times 10^{17}$  atoms/ $\text{cm}^3$  (ASTM F-121, 1979) or less, and carbon concentration is  $0.5 \times 10^{16}$  atoms/ $\text{cm}^3$  or more.

2. The high-resistance silicon wafer according to claim 1, wherein a density of a LPD (Light Point Defect) having a size of 0.12  $\mu\text{m}$  or more and observed on a surface of the wafer is controlled so as to be 0.2/ $\text{cm}^2$  or less.

3. A high-resistance silicon wafer having resistivity of 100  $\Omega\text{cm}$  or more, wherein a density of a grown-in defect detected by seco etching is  $1 \times 10^3/\text{cm}^{-3}$  or less, an oxygen precipitate (BMD) having a size of 0.2  $\mu\text{m}$  or more is formed so as to have density of  $1 \times 10^4/\text{cm}^2$  or more in the wafer and an oxygen concentration in the wafer is  $12 \times 10^{17}$  atoms/ $\text{cm}^3$  (ASTM F-121, 1979) or less.

4. The high-resistance silicon wafer according to claim 3, wherein carbon concentration in the wafer is  $0.5 \times 10^{16}$  atoms/ $\text{cm}^3$  or more.

5. The high-resistance silicon wafer according to claim 1 or 3, wherein a DZ (Denuded Zone) layer is formed at least 5  $\mu\text{m}$  or more in depth from a surface of the wafer.

6. The high-resistance silicon wafer according to claim 1 or 3, wherein value of oxygen concentration (ASTM F-121, 1979) of the wafer is limited in ranges of  $12 \times 10^{17}$  atoms/ $\text{cm}^3$  or less,  $7 \times 10^{17}$  atoms/ $\text{cm}^3$  or less, and  $5.8 \times 10^{17}$  atoms/ $\text{cm}^3$  or less when the resistivity of the wafer is not less than 100  $\Omega\text{cm}$  and less than 300  $\Omega\text{cm}$ , not less than 300  $\Omega\text{cm}$  and less than 2000  $\Omega\text{cm}$ , and not less than 2000  $\Omega\text{cm}$ , respectively.

7. (Amended) A manufacturing method of a high-resistance silicon wafer, characterized in that a primary silicon wafer in which resistivity is  $100\ \Omega\text{cm}$  or more, oxygen concentration is  $12 \times 10^{17}$  atoms/cm<sup>3</sup> (ASTM F-121, 1979) or more, and a carbon concentration is  $0.5 \times 10^{16}$  atoms/cm<sup>3</sup> or more is used, a remaining oxygen concentration in the wafer is controlled to be  $12 \times 10^{17}$  atoms/cm<sup>3</sup> (ASTM F-121, 1979) or less by performing a heat treatment for forming an oxygen precipitate nucleus and a heat treatment for growing the oxygen precipitate on the primary silicon wafer.

8. A manufacturing method of a high-resistance silicon wafer, characterized in that a primary silicon wafer in which resistivity is  $100\ \Omega\text{cm}$  or more, an oxygen concentration is  $14 \times 10^{17}$  atoms/cm<sup>3</sup> (ASTM F-121, 1979) or more, and a density of a grown-in defect detected by seco etching is  $1 \times 10^3/\text{cm}^{-3}$  is used, a remaining oxygen concentration in the wafer is controlled to be  $12 \times 10^{17}$  atoms/cm<sup>3</sup> (ASTM F-121, 1979) or less by performing a heat treatment for forming an oxygen precipitate nucleus and a heat treatment for growing the oxygen precipitate on the primary silicon wafer.

9. The manufacturing method of the high-resistance silicon wafer according to claim 7 or 8, wherein the heat treatment for forming the oxygen precipitate nucleus is a low-temperature heat treatment performed at 500 to 900°C for 5 hours or more.

10. The manufacturing method of the high-resistance silicon wafer according to claim 9, wherein the conditions of the low-temperature heat treatment is at 700 to 900°C for 5 hours or more.

11. The manufacturing method of the high-resistance

silicon wafer according to claim 7 or 8, wherein the heat treatment for growing the oxygen precipitate is a high-temperature heat treatment performed at 950 to 1050°C for 10 hours or more.

12. The manufacturing method of the high-resistance silicon wafer according to claim 7 or 8, characterized in that an oxygen outward diffusion heat treatment is performed on the wafer at 1100 to 1250°C for 1 to 5 hours before the heat treatment for forming the oxygen precipitate nucleus.

13. The manufacturing method of the high-resistance silicon wafer according to claim 12, characterized in that the oxygen outward diffusion heat treatment is performed in a gas atmosphere containing nitrogen gas.

14. The manufacturing method of the high-resistance silicon wafer according to claim 12, characterized in that the oxygen outward diffusion heat treatment is performed in an atmosphere of a hydrogen gas, argon gas or mixed gas of these.

15. The manufacturing method of the high-resistance silicon wafer according to claim 7 or 8, characterized in that a rapid thermal annealing process is performed on the wafer before the heat treatment for forming the oxygen precipitate nucleus.

16. The manufacturing method of the high-resistance silicon wafer according to claim 15, wherein the conditions of the rapid thermal annealing process is 1150 to 1300°C for 1 to 60 seconds in an atmosphere containing nitrogen.

17. (Amended) The manufacturing method of the high-resistance silicon wafer according to claim 8, wherein a carbon concentration in the primary silicon wafer is  $0.5 \times 10^{16}$  atoms/cm<sup>3</sup> or more.